CLAIMS

1. An electrode plate for a plasma reactor comprising a dielectric member and an electrode protected from a discharge space by the dielectric member,

wherein more than two electrode plates are stacked such that a gap which forms the discharge space is interposed between the adjacent electrode plates and the electrodes are connected alternately to the two poles of an electric source, and

an outer surface of the dielectric member exposed to the discharge space is coated with a porosity reduction material.

2. The electrode plate for the plasma reactor as claimed in claim 1,

wherein the electrode plate is formed by bonding together plural dielectric sheet plates with a porosity reduction material, at least one dielectric sheet plate having the electrode on a surface facing another dielectric sheet plate.

3. The electrode plate for the plasma reactor as claimed in claim 1 or 2, wherein the porosity reduction material is a glass paste.

4. An electrode plate for a plasma reactor comprising a dielectric member and an electrode protected from a discharge space by the dielectric member,

wherein the electrode plate has an electric-connecting coupling hole on one side and a non-electric-connecting coupling hole on the other side;

the electrode has a hole surrounding part which surrounds the electric-connecting coupling hole, a discharging part which is formed widely on an area corresponding to the discharge space, and a connecting neck part which is formed narrowly and connects the hole surrounding part with the discharging part;

and

an electric-conductive coupler through which electricity is applied to the electrode to generate a plasma discharge is inserted into the electric-connecting coupling hole.

5. A plasma reactor comprising:

more than two electrode plates, each electrode plate including a dielectric member and an electrode protected from a discharge space by the dielectric member and having an electric-connecting coupling hole on one side and a non-electric-connecting coupling hole on the other side, the electric-connecting coupling hole having a shoulder on which the electrode is exposed, the electrode plates being stacked such that a gap is interposed between the adjacent electrode plates and the electric-connecting coupling hole and the non-electric-connecting coupling hole are alternately arranged,

a spacer installed between the adjacent electrode plates, and

an electric-conductive coupler which is inserted through an array of the electric-connecting coupling hole and the non-electric-connecting coupling hole to couple the electrode plates together, and is caught into contact with the shoulder to be electric-connected with the electrode,

wherein electricity is applied through the electric-conductive coupler to the electrode to generate a plasma discharge.

6. The plasma reactor as claimed in claim 5,

wherein the electric-conductive coupler comprises plural coupler elements joined together in an axial direction, each coupler element consisting of single body.

7. The plasma reactor as claimed in claim 6,

wherein the coupler element has an electric-connecting part inserted into the

electric-connecting coupling hole and the gap over the electric-connecting coupling hole, a non-electric-connecting part inserted into the non-electric-connecting coupling hole and the gap over the non-electric-connecting coupling hole, and a joining part joining the coupler elements together for more than two electrode plate to be stacked.

8. The plasma reactor as claimed in claim 7,

wherein the coupler element is formed such that the joining part is on the opposite side of the non-electric-connecting part from the electric-connecting part;

the electric-connecting part has a larger outer diameter than the non-electric-connecting part and the non-electric-connecting part has either a larger outer diameter than the joining part or as large an outer diameter as the joining part;

the electric-connecting part has a shoulder corresponding to the shoulder of the electric-connecting coupling hole; and

the joining part has a male thread on an outer surface and the electric-connecting part correspondingly has a female threaded hole, the joining part being inserted into the female threaded hole of the electric-connecting part of another adjacent coupler element so that the coupler elements are joined together.

9. The plasma reactor as claimed in claim 5,

wherein the electric-conductive coupler includes a coupling shaft and a wing which are joined together;

the coupling shaft consists of single body and is inserted through an array of the electric-connecting coupling hole and the non-electric-connecting coupling hole which are alternately arranged; and

the wing is joined to an outer surface of the coupling shaft and is caught into contact with the shoulder of the electrode plate.

10. The plasma reactor as claimed in claim 9,

wherein the wing has a through hole at its center into which the coupling shaft is inserted and a lateral opening which extends in the radial direction from the through hole, and

the coupling shaft has a large outer diameter part onto which the wing is joined and a small outer diameter part whose diameter is smaller than a width of the lateral opening.

11. The plasma reactor as claimed in claim 10,

wherein the large outer diameter part is inserted into the electric-connecting coupling hole and the gap over the electric-connecting coupling hole;

the small outer diameter part is inserted into the non-electric-connecting coupling hole and the gap over the non-electric-connecting coupling hole; and

the spacer inserted into the gap over the non-electric-connecting coupling hole has a through hole with a larger inner diameter than the outer diameter of the large outer diameter part.

12. The plasma reactor as claimed in claim 10,

wherein the coupling shaft has a male thread on an outer surface of the large outer diameter part and the wing has a female thread on an inner surface of the through hole, the coupling shaft and the wing are joined together in a screwed type.

13. The plasma reactor as claimed in claim 5,

wherein the electrode plate comprises a first dielectric sheet plate and a second dielectric sheet plate, the first dielectric sheet plate having the electrode on one onto which the second dielectric sheet plate is bonded;

the first dielectric sheet plate has the electric-connecting coupling hole with a small diameter which contacts with the electrode and the non-electric-connecting

coupling hole with a small diameter;

the second dielectric sheet plate has the electric-connecting coupling hole with a large diameter and the non-electric-connecting coupling hole with a small diameter; and

the first dielectric sheet plate and the second dielectric sheet plate are bonded together such that the electric-connecting coupling holes and the non-electric-connecting coupling holes are arranged in line respectively.

14. The plasma reactor as claimed in claim 5,

wherein the electric-conductive coupler includes a coupling shaft and a medium, the coupling shaft consisting of single body and being inserted through an array of the electric-connecting coupling hole and the non-electric-connecting coupling hole which are alternately arranged, the medium contacting with an outer surface of the coupling shaft and the shoulder of the electrode plate at the same time.

15. The plasma reactor as claimed in claim 14,

wherein the electrode plate comprises a first dielectric sheet plate and a second dielectric sheet plate, the first dielectric sheet plate having the electrode on one surface onto which the second dielectric sheet plate bonded;

the first dielectric sheet plate has the electric-connecting coupling hole with a small diameter which contacts with the electrode and the non-electric-connecting coupling hole with a large diameter;

the second dielectric sheet plate has the electric-connecting coupling hole with a large diameter and the non-electric-connecting coupling hole with a small diameter; and

the first dielectric sheet plate and the second dielectric sheet plate are bonded together such that the electric-connecting coupling holes and the non-electric-connecting coupling holes are arranged in line respectively.

16. The plasma reactor as claimed in claim 14,

wherein the medium is an electric-conductive bushing.

17. The plasma reactor as claimed in claim 14,

wherein the non-electric-connecting coupling hole has a shoulder facing opposite to the shoulder of the electric-connecting coupling hole.

18. The plasma reactor as claimed in claim 17,

wherein a non-electric-conductive bushing is installed into contact with an outer surface of the coupling shaft and the shoulder of the non-electric-connecting coupling hole.

19. The plasma reactor as claimed in claim 16 or 18,

wherein the spacer has a through hole into which the coupling shaft is inserted to encompass an outer surface of the coupling shaft, and has a recess in a place facing the shoulder, and

the bushing is inserted between the recess and the shoulder.

20. The plasma reactor as claimed in any one of claims 5 to 18,

wherein the shoulder is a circular step which is formed by a change of an inner diameter of the coupling hole.

21. The plasma reactor as claimed in any one of claims 5 to 12, 14, and 16 to 18,

wherein the electrode plate comprises a first dielectric sheet plate and a second dielectric sheet plate which are bonded together such that the electrode is located between the first dielectric sheet plate and the second dielectric sheet plate, and

the first dielectric sheet plate and the second dielectric sheet plate is bonded with a ceramic paste.

22. The plasma reactor as claimed in any one of claims 5 to 18, wherein the spacer has a through hole into which the electric-conductive coupler is inserted, the through hole encompassing an outer surface of the electric-conductive coupler.

23. The plasma reactor as claimed in any one of claims 5 to 18, wherein the spacer is made of a glass fiber.

24. The plasma reactor as claimed in any one of claims 5 to 18, wherein a part of the electric-conductive coupler inserted into the non-electric-connecting coupling hole has a smaller outer diameter than an inner diameter of the non-electric-connecting coupling hole, and

the spacer corresponding to the non-electric-connecting coupling hole has a prominent bushing part which is inserted between the non-electric-connecting coupling hole and the electric-conductive coupler.

25. The plasma reactor as claimed in any one of claims 5 to 18, wherein a washer is inserted between the shoulder of the electrode plate and the electric-conductive coupler.

26. The plasma reactor as claimed in any one of claims 5 to 18, wherein an outward exposed part of the electric-conductive coupler inserted through an array of the coupling holes on one side is covered with an insulating cap to insulate and fix the electric-conductive coupler, and

the electric-conductive coupler installed through an array of the coupling holes

27. The plasma reactor as claimed in any one of claims 5 to 18,

wherein the electrode has a hole surrounding part which surrounds the electric-connecting coupling hole, a discharging part which is formed widely on an area corresponding to the discharge space, and a connecting neck part which is formed narrowly and connects the hole surrounding part with the discharging part, and

the hole surrounding part has the same radial width as an exposed part of the shoulder.

28. The plasma reactor as claimed in claim 5,

wherein the electrode plate is the electrode plate according to any one of claims 1, 2 and 4.

29. A plasma reactor comprising:

more than two electrode plates, each electrode plate including a dielectric member and an internal electrode protected by the dielectric member,

a guide structure separably supporting the electrode plates in such a manner that the electrode plates are stacked apart from each other,

wherein the electrodes of the electrode plates stacked apart from each other are connected alternately with the two poles of an electric source and electricity is applied to the electrodes to generate a plasma discharge.

30. The plasma reactor as claimed in claim 29,

wherein the guide structure has slide slots into which the electrode plates are inserted to be stacked.

31. The plasma reactor as claimed in claim 30,

wherein an elastically supporting means is installed between a sliding surface of the electrode plate and the slide slot.